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P A P E R S

I N

M E C H A N I C S.



MECHANICKS.

The SILVER MEDAL was this Session presented to Mrs. WYNDHAM, for her ingenious contrivance of a method of using to the best advantage, the power applied to the CROSS-BAR LEVER, for raising large weights, as described in the following Letter, and shewn by the Cut annexed.

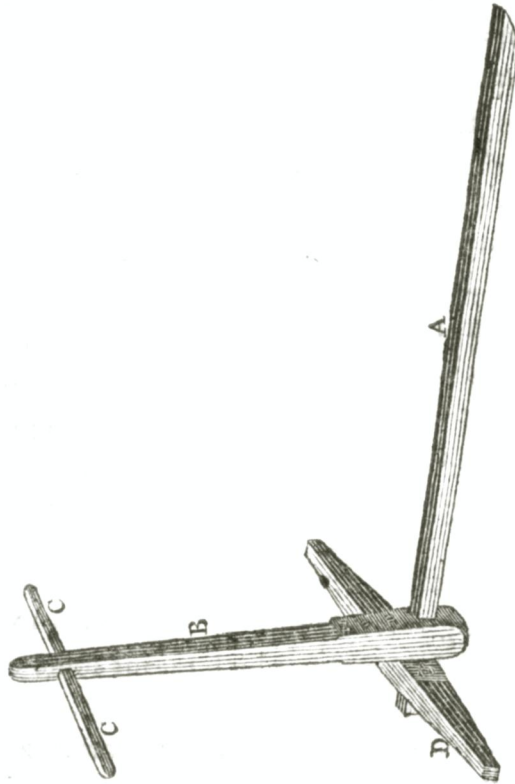
S I R,

I HAVE sent you a Model of a mechanical invention of my own, which you will laugh at, as every body here did at first; but I assure you, it has proved of great use, and the workmen all approve of it very much. Since you left Petworth, a great work has been begun, of moving earth in which there are great quantities of stone; I observed that the men made use of the Lever in a very ineffectual manner, by standing three or four at a time on the bar of the Lever; by which means some of them were placed so near the fulcrum, that their power was in a great degree lost; besides, they were obliged to steady them-

felves upon sticks, for fear of falling, which took off from their weight upon the Lever.

My invention will be best explained by the Model.

Mrs. WYNDHAM's improved Cross-bar Lever.



A, is

A is the Lever ; B is an upright piece of wood to be fixed to the Lever, taking care that the side marked with the letter B be placed opposite the letter A, on the Lever ; as by that means it inclines backwards, which increases the power : C is a cross-bar for the workmen to hold by ; D is a cross-bar to be placed at bottom, behind the upright piece of wood for the men to stand upon, and the end of the Lever passes through it : these additions are made to take on and off, and are only to be used when the strength of the rocks require an increase of power. The workmen all agree that it is of very great service to them ; and I wish I could prevail upon you to come here, and I dare say that your great knowledge would suggest some improvement.

I am, SIR,

Your obedient humble servant,

ELIZABETH WYNDHAM.

*Petworth,
October 28, 1795.*

In a subsequent letter, dated February 22, 1796, there is the following passage :

In

“ In my explanation of the Lever, I forgot to mention, that if the rock to be moved should be, as I have often seen it, placed so high above the ground as to put the men in danger of being hurt by falling, on the displacing of the rock, in such case the Lever may be reversed, so that the men will then stand upon the bar, where, in common cases, their hands are placed; and thus they will not be in danger of falling.”

The several parts of the Lever, as shewn in the Cut annexed, are marked as they were in the Model, which is reserved in the Society's Repository for the inspection of the Public.

A Bount

A Bounty of THIRTY GUINEAS was this Session voted to Mr. JOHN UPTON, of Petworth, Suffex, for his contrivance of a MOVABLE BARN-FLOOR, as described in the following Papers, and exemplified by the Plate annexed; and of which a complete Model, on a scale of one inch and a half to the foot, is reserved in the Society's Repository for the use of the Public.

THE heavy and continual expences attending Barn-Floors, and the great consumption of valuable timber in the construction of them, has always been very injurious to the landed interest of the kingdom; and the great waste of Corn in threshing upon them, as soon as they begin to decay, has ever been a heavy loss to the tenants and to the public: it was therefore very desirable that some new plan should be discovered less wasteful and more durable.

John

John Upton, of Petworth, in Suffex, has constructed a Barn-Floor in that neighbourhood, which he hopes will accomplish both these objects. The Barn-Floors now in common use consume the large and valuable oak-timber, often such as might be converted into two-and-a-half inch ship-plank; and which is, at this time, very difficult to be procured at any price: they last only from fifteen to twenty years; and, as they are subject to frequent injuries from the exertions of the horses in drawing loaded waggons into the barn, they require frequent repairs; and, if one plank fails, it cannot be effectually repaired without taking up all the planks from the door to the part that has given way.

Hollow beech-floors, which were introduced a few years since, on account of the very high price of oak-timber, are found not to wear more than seven or eight years, and consequently do not answer. Hollow floors, whether of oak or beech, are much better to thresh on than those laid on the ground; and, as the planks of the

proposed Floors are much thinner than those in present use, the vibration is stronger, and consequently the corn more thoroughly threshed out than on the common hollow floors.

The proposed Barn-Floor effectually prevents a waste of corn in threshing ; it gives an addition of at least one foot in height at the doors, by which means a higher load of corn can be admitted ; and also, as the horses do not draw the waggon up an ascent, and upon a slippery floor, but upon a hard bottom, and level with the farm-yard, two horses can perform the work, where four are now generally used. It affords a warm and convenient shelter for hogs, when it is down ; and, when it is turned up, it may be used as a stable, ox-stall, hovel, or cart-house ; two men can place or displace it in five minutes : and, from its allowing at all times an easy access to dogs and cats under it, it affords no harbour for vermin.

The

302 MECHANICKS.

The following are Statements of the Materials used, and the Expence of the Barn-Floors, respectively.

BARN-FLOORS NOW IN COMMON USE.	JOHN UPTON'S BARN- FLOOR.
The original Floor £. s. laid on the ground, with three cills, and two-inch oak-plank, which in general lasts from fifteen to twenty years - - - 19 10	The new-construct- £. s. ed Hollow Floor is composed of oak- plank, five feet eight inches in length, and one inch and a half thick; whereas three- fourths of the plank used in the original Floors, are fourteen feet in length - - 23 10
The Hollow Floors on Brick Quoins, with two-and-a-half inch oak-plank - - - 31 10	

The plank for the last-mentioned Floor may be composed of deal, beech, or elm, as they will be perfectly free from decay by damp, which will considerably lessen the expence of the new-constructed Floor: the estimates are made when the materials are supplied by a carpenter. When they are furnished from the estate, a very considerable further advantage arises to the landlord, as the new-constructed floor is composed of small scantlings, which may be had from short timbers, much inferior in value to those used for the other floors.

Where

Where there are more than one barn in a farm-yard, this Floor may be further useful, as it may be removed from one barn to another, and save the expence of at least one out of three.

It is supposed that a Floor constructed in this manner will last for an hundred years, or indeed as long as the barn; because it is perfectly free from damp, on account of the distance at which it lies above the ground, with a free current of air passing under it when down; and, when it is turned up (which it probably will be at least half the year), it will be as free from decay as the posts or beams of the barn.

WE, whose names are hereunto subscribed, tenants on a farm whereon John Upton has laid his new-constructed Barn-Floor, do certify, that, in all respects, it exceeds every thing we have seen of its kind, particularly in threshing, as its vibration assists the thresher beyond conception.

WILLIAM KNIGHT.

THOMAS HOLT.

SIR,

S I R,

I FIND they have threshed some corn upon the new Barn-Floor, and the threshers say it is the best floor they ever threshed upon, on account of its superior elasticity, which I thought must be case; it has also another property, which I did not foresee, and which is occasioned by the great cavity under the floor, and which is also useful to farmers, that is, that every stroke of the flail resounds so much, that it may be heard for a mile round; so that the farmer, when on any part of his grounds, can tell whether his men in the barn are working or idle.

I am, SIR,

Your very humble servant,

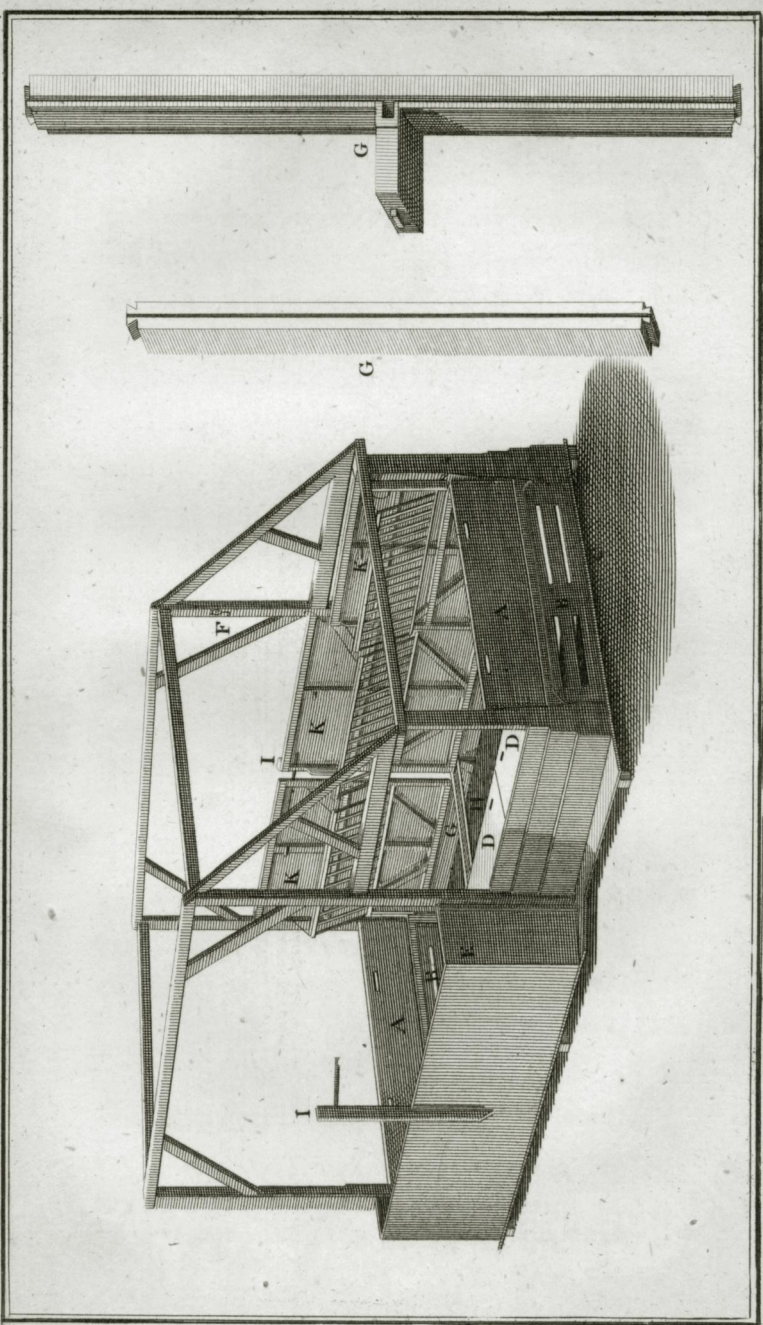
EGREMONT.

Grosvenor-Place.

Mr. MORE.

Explanatoin

Plate 4.



Mr. F. W. Wyllys' Moveable Barn Floor.

Explanation of the Plate of Mr. UPTON's new-constructed Barn-Floor; one part of which shews the Floor laid down for threshing on; the other, the part raised up with racks for feeding Cattle, &c.

- A. Rack-boards.
- B. Slip-boards, to admit air.
- C. Wooden door-fills for the slip-boards, B, to rest on.
- D. Moveable floors, to one part of which are wooden legs serving to support it, when it is necessary to put the displaced timbers into the recess E.
- E. Recess to receive the threshed corn before it is winnowed, or to hold the moveable timbers.
- F. An iron hook to lift up the floor, when not used for threshing on: there are two of these hooks used in the barn at large.
- G. Moveable timbers which support the floor, having grooves along their surfaces, to prevent the loss of corn: two

of these timbers are shewn larger at G G; one being the cross-piece, with a leg and a tenon for fixing in the stone mortice; the other designed to lie lengthwise, and level with the floor of the barn: in the ground are fixed stones, with mortices in them, to receive the tenons of the above-mentioned timbers; but which, though shewn in the Model, could not be expressed in this small Plate.

- H. The ground, which should be made of materials sufficiently hard to prevent the horses or waggon making impression therein.
- I. I. Posts with iron hasps to support the floors when out of use.
- K. Racks to feed cattle, when the barn is applied to other purposes than threshing on.

*When the Floor is not wanted for
threshing on.*

First turn up the floors, and fix them fast with the iron pins, bolts, and hasps; then
take

take out the middle timbers ; next, the cross timbers: place them on the ground, on that side which is opposite to the recess, where the timbers are to be deposited when out of use ; then let down that part of the floor that has legs to support it: put the timbers into the recess, and turn the floor up again.

The Premium of **FIFTY GUINEAS**, that for several years past was offered by the Society for the forming a **METAL ROPE** or **CHAIN**, which should answer the purpose of a Hempen Rope in large Manufactories, was this Session adjudged to Mr. **WILLIAM HANCOCK**, of Birmingham, from whom a proper Sample of the Chain, and the annexed Certificates, were received; and of which a Wood Cut is annexed.

THIS is to certify, that I have seen a Chain or Iron Rope, invented by William Hancock, used by Mr. William Bingley, in his Plated-wire Manufactory, for the very powerful purpose of drawing large wire; and I observed, that it runs as flexible on the pulley as an hempen rope; and I believe it to be much stronger, and will wear much longer, than a rope of two inches diameter, made of the best hemp: and I do also believe, that its strength may be more safely relied on, as the wire of which it is made, has, in every part of it,
first

first borne an equal purchase, in being cold drawn, for the purpose of making the said Chain or Iron Rope.

J. MILES.

*Birmingham,
October 31, 1795.*

THIS is to certify, that I have frequently seen and admired, an Iron Chain used in Mr. Bingley's Manufactory for Drawing Wire, made on Mr. Hancock's principle; and which I have no doubt will answer the purpose of drawing coals much better than a rope, it having an advantage of being as strong where it coils round a small barrel as where it is strait. A rope is weakened in being bent, and takes more power to open and shut than the Chain. Bad iron cannot be used in it, nor can a faulty place escape being found, in the operation of cold-drawing.

WILLIAM WHITMORE.

*Birmingham,
October 31, 1795.*

SIR,

IN order to strengthen the claim, the inventor of the Metallic Rope or Chain has to the bounty and encouragement of the Society, I take the liberty to acquaint you, that I have made use of such Chain, made by William Hancock, for about four years : it works over a nine-inch pulley, and answers admirably well ; and as, from Hancock's situation in life, he is not able to make them for sale, I have executed many orders : and, if you have any opportunity to recommend a trial of them to any gentleman you may know in London, shall esteem it a favour, as I am sure they surpass any thing of the kind hitherto made.

I am, SIR,

Your obedient humble servant,

WILLIAM BINGLEY.

Birmingham,
November 19, 1795.

SIR,

S I R,

I AM favoured with yours of the 27th past, respecting Hancock's Iron Rope or Chain, and have, in reply, to inform you, that a Chain of his making is now in use at our foundry here; and has been, for five or six years past, used instead of a rope at the large triangles, for loading castings, breaking old guns, metal, &c. The iron or wire of which it is made, is about three-eighths of an inch diameter, and occasionally lifts two or three tons.

We had some time since a chain of that kind worked in a pit about fifty yards deep, and a hempen rope to work against it; but the colliers taking a prejudice against it, we employed it otherways.

We have now, at most of our engines where ropes are required, adopted those Chains for drawing up pistons from the cylinders, &c. and, where ropes are subject to steam and wet situations, they are far preferable to ropes, as they work perfectly pliable and easy over either pulleys or rollers.

X 4

We

We have had some of those Chains made from English and Foreign Iron, but they have sometimes failed, through the iron being faulty.

The only iron to be depended upon, is thick wire, as the drawing of it detects any fault in the quality. Chains made from this wire would come into more general use instead of ropes, if it were not for the scarcity as well as high price of this kind of iron.

We have had a Chain from Hancock a few weeks since, seventy-one yards long, bare three-eighths wire, weight two hundred and sixteen pounds, or about three pounds per yard; will work two tons. If the obstacles before mentioned were not in the way, we should have those Chains in more general use than they are; but this objection should not deprive the claimant of the merit due to his invention.

I am, SIR,

Your most obedient servant,

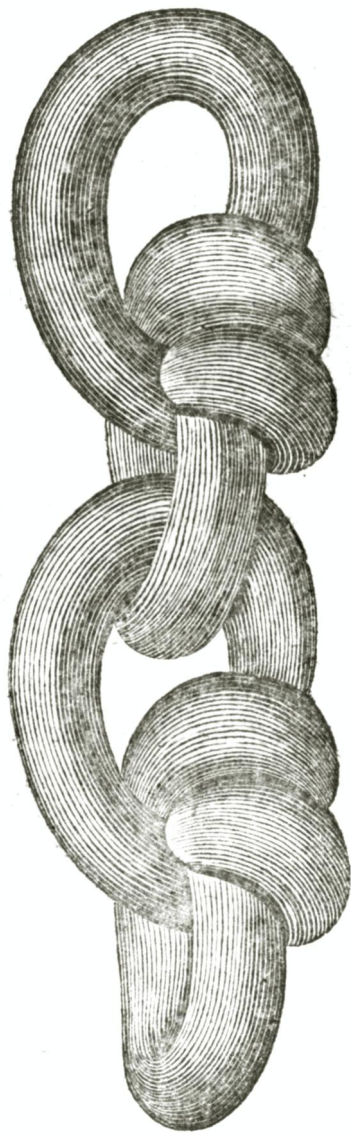
WILLIAM JOHNSON.

Bradley,
Dec. 2, 1795.

Mr. MORE.

Mr.

*Mr. WILLIAM HANCOCK's Metal Rope
or Chain.*



*Description of the Cut of Mr. HANCOCK'S
Iron Rope or Chain.*

These Chains are designed as a substitute for ropes, and applicable to all the purposes to which they are adapted, particularly in the working of coal and other mines ; also for cranes, wells, &c. From the mode of making the common Chains, they are very uncertain, and are known to break in the welded parts when over-strained ; which objection is, in these Chains, removed, by the manner in which they are made, being woven together (while cold) out of the stoutest iron drawn into wire, and so managed, that it is next to impossible there should be a bad link.

FORTY GUINEAS, being the Premium offered for a method of CLEARING NAVIGABLE RIVERS OF WEEDS, was this Session adjudged to LE CHEVALIER DE BETANCOURT MOLINA, whose Paper and a Plate of his Contrivance are annexed.

S I R,

I HAVE the honour to transmit to you, to be laid before the Society for the Encouragement of Arts, Manufactures, and Commerce, a Model, with a Drawing and Explanation, of a Machine for clearing Navigable Rivers and Canals from Weeds.

Should my idea fortunately meet approbation, I shall deem myself amply recompensed in receiving the distinguished mark of honour proposed by the Society for the successful invention of the above object. I have the honour to be most respectfully,

S I R,

Your most obedient servant,

DE BETANCOURT MOLINA,

Director of the Royal Cabinet of Machines
of his Catholic Majesty.

*Hans Place, Sloane-Street, Chelsea,
January 31, 1796.*

Mr. MORE.

De-

*Description of the Plate of the Machine for
Cutting Weeds in Navigable Canals and
Rivers.*

To clear Navigable Canals and Rivers from Weeds, which commonly grow in their bottoms and banks, two operations are requisite; first, either to cut or pluck them up by their roots; and next, to take them out of the water, if the current be not strong enough to carry them away.

The second operation is evidently of small importance: the first is the only one for which a machine seems necessary to be proposed to the public, by the Society for the Encouragement of Arts, Manufactures, and Commerce.

A machine calculated for plucking up weeds by the roots would necessarily require a great variety of motions, and parts of different shapes, adapted to the different sorts of plants, which would render the machine too complicated for the skill of that class of people for whose management it is intended; besides, in stiff clays, in
which

*The Machine for clearing Navigable Rivers from Weeds
invented by the Chevalier de Belancourt. Volina.*

Fig. 1.

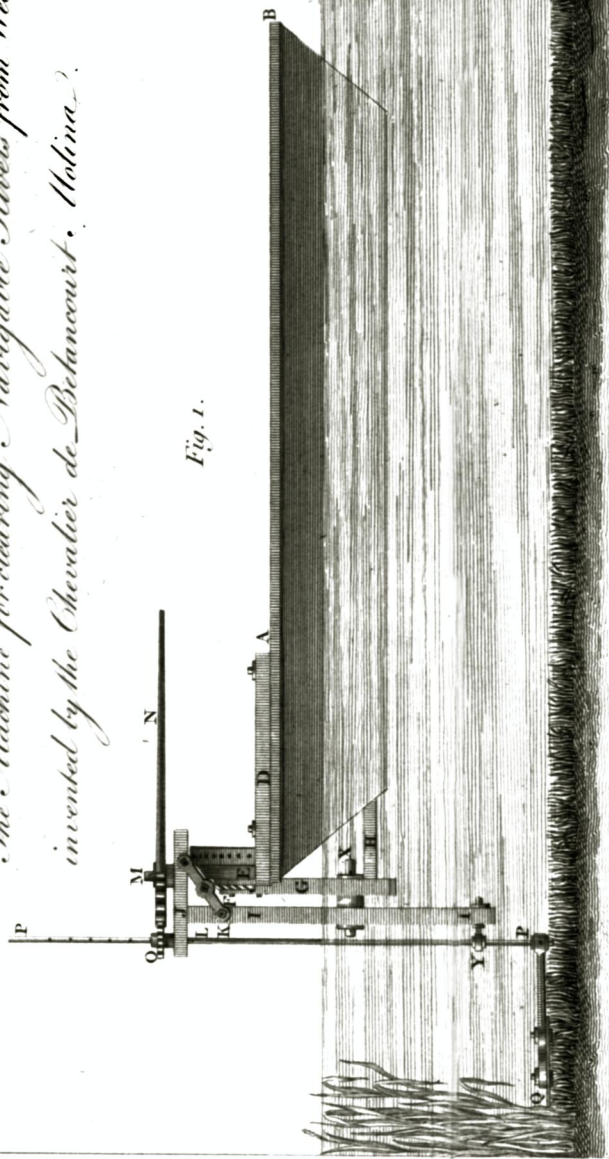
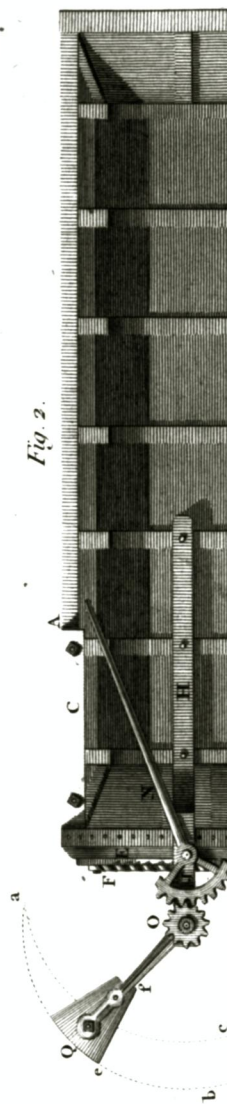
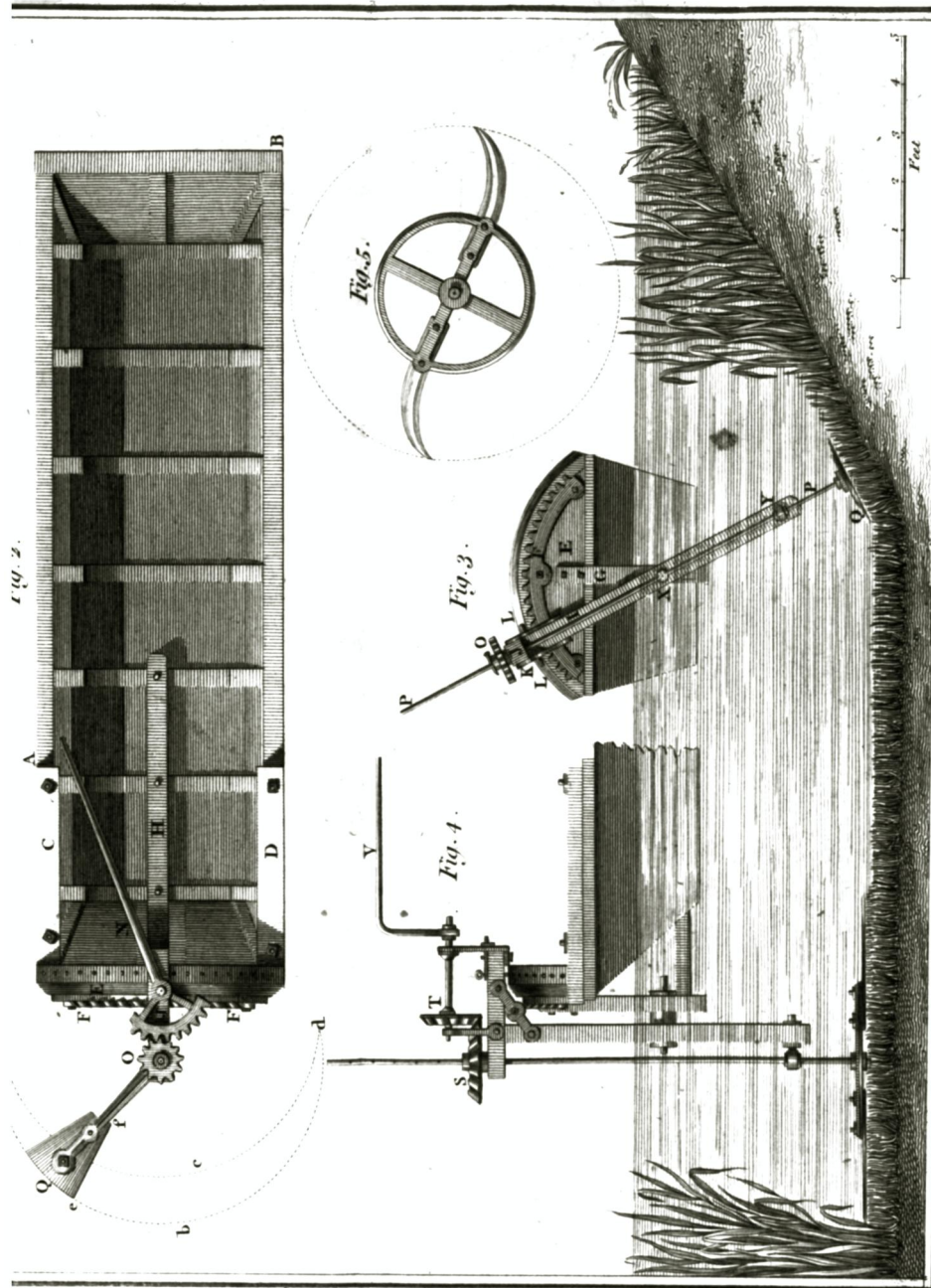


Fig. 2.





which the roots penetrate a considerable depth, it would require not only a very great power, but also such a waste of time as to render the operation too slow and expensive; another inconvenience still greater, attending such an operation, would be, the destroying the texture which the fibres of the roots form with the earth, particularly in banks, thereby preserving them from being destroyed by the current. The loss of this protection would occasion a gradual accumulation of earth in the bottom of the Rivers and Canals, and thereby render their navigation either difficult or impracticable. The Machine hereafter described, and shewn in the Plate, is therefore intended for cutting or mowing the weeds, and not for plucking them up by the roots, being persuaded the former method is more conformable to the intention of the Society.

Fig. 1, 2. A, B. A barge or flat-bottomed boat, which supports the machine: its length, from eighteen to twenty feet; its breadth at the top, five
5 feet

feet six inches; and its depth, two feet six inches: these dimensions may vary according to the situations and uses to which the machine is to be applied.

- C, D. Two pieces of wood fixed in the segment E, *fig. 3*, and with which the machine is held fast to the barge.
- E. A wooden segment, whose arch is described from the centre X: this segment measures 90 degrees, and each 5th degree has a hole to receive an iron pin, with which the beam I J is fixed in a direction perpendicular to the plane in which the weeds grow.
- F. A quarter of a circle of cast iron with teeth, fixed upon the segment E.
- G. An upright post (fixed at one end upon the segment E, and upon a cross post H), in which the axis X is fastened.
- H. A cross post which pins through, and is fixed to the bottom of the barge, supporting the upright post G.
- I J. A beam which moves upon the axis X: its length, from its axis X to its lower end,

end, ought to be in proportion to the depth in which the machine is to cut.

K. Two iron pieces fastened to the beam I, and to the cross-post J, and which are to receive between them a worm L, which is to take into the teeth of the quarter of a circle F.

L. An iron worm whose axis passes through the two iron pieces K, by which the beam I is to be brought to a direction perpendicular to the plane in which the weeds grow.

M. Axis fixed at the top of the beam I J, on which turns the lever N.

N. A lever which turns on the axis M, and whose shorter end terminates in a toothed segment, of about a third part of a circle.

O. A toothed wheel, whose diameter is one half the diameter of the one in which the shorter end of the lever terminates, and whose teeth take into them.

P. A rod of bolt iron, which passes through the centre of the wheel O, and through a ring Y, fixed near the bottom
of

of the beam *I J*; on the lower end of which rod is fixed the handle of a cutter: this rod, at its upper part, has several holes, six inches distant from each other, and which are to receive an iron pin, which is to fix the wheel *O*, and to raise or lower the cutter according to the depth of water.

Q. The cutter with its handle, which is fixed on the iron rod *P*, which may be made of a variety of forms, to cut the weeds with a stroke neither too oblique nor too direct, which practice will best determine; but perhaps the simple form expressed in the figure would be as good as any. It is evident, that the lever *N* being moved by one or two men, the wheel *O* will turn, and with it, the rod *P*, together with the cutter. It is equally clear that, during the time in which the lever *N* describes a quarter of a circle, the cutter will move a complete semicircle: the space *a b d c a* will be cut at each stroke, the distance from *b* to *c* being the space passed by the boat between

tween the strokes, which must be less than the length ef of the cutter.

Having thus described the construction of this Machine, and the manner in which it acts, let us consider how it is to be used.

In every River or Canal intended to be cleared from its weeds, the first thing is to measure the depth of the water, and arrange the machine in such a manner, that the end of the beam I. be at least one foot, and the cutter about six inches, higher than the bottom. This being done, the barge may be drawn by a rope against the current, in order that the weeds may be carried away as they are cut : if the stream be not sufficient for that purpose, a man or two at the lower end of the barge will easily draw them up into it by hooks, nets, or otherwise.

As weeds often grow on banks that have more or less obliquity, the beam may be placed in a direction perpendicular to the bank, by first taking out the iron pin which fastens the cross-post J and beam I, upon the segment E ; then turn the worm L till the beam comes into the required position,

Y and

and fix it by the iron pin into the segment, as before. As the inclination of the sides of Navigable Canals is never so great as an angle of 45 degrees, neither the arch of the segment E, nor that of the toothed piece F, need be greater than the quarter of a circle.

To sharpen the cutter when necessary, the beam, by turning the worm all over the quarter circle F, is to be completely turned, so as to present its lower end, and the cutter upwards, which will be very easily done with the hand.

The repeated strokes of the cutter may be preferable, when either the plants are so hard, or so thick, as to require a great force to cut them; but otherwise, the rotatory motion will be far more expeditious: in which case, there may be two opposite cutters (*fig. 5*); and the lever N, together with the wheel O, being taken off (*fig. 1* and *2*), two bevel-toothed wheels S T (*fig. 4*) will be placed, to be turned by the winch V: these cutters may be sharp on both sides, and, by changing the motion of
either

either edge, may be used according to the nature of the weeds; and here it may be remarked, that the quicker the motion of the cutter, the easier will the weeds be cut, and less power lost by their resistance.

The diameter of the bevel-wheels in the figure is as two to three; but practice and judgment may suggest some alteration in the proportion of these as well as other parts of the machine, from the different resistance required to be overcome.